

We claim:

1. A system for controlling the width of a moving fabric web that is moving through a fabric compactor system, the fabric compactor system having a mechanical spreader, a fabric conveyor and a folder, wherein the mechanical spreader is located upstream of the fabric  
5 conveyor, and the fabric conveyor has a downstream end that delivers a moving fabric web to a folder, comprising:

(a) a camera, wherein the camera captures an image of a preselected portion of a moving fabric web;

(b) a controller, wherein the controller receives from the camera the captured  
10 image of the preselected portion of the moving fabric web;

calculates the width of the preselected portion of the moving fabric web using the received, captured image;

compares the calculated width of the moving fabric web to a first width set point;

15 causes a width setting of the mechanical spreader to change from the first width set point to a second width set point if the calculated width of the preselected portion of the moving fabric web varies from the first width set point; and

wherein, the image of the preselected portion of the moving fabric web is captured proximate to the downstream end of a fabric conveyor.

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2. The system of Claim 1, wherein the camera is a CCD camera.

3. The system of Claim 1 wherein the camera is mounted to capture a series of digital of the fabric web.

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4. The system of Claim 1 wherein the camera captures an image of the entire width of the moving fabric web.

5. The system of Claim 2 wherein the CCD camera is mounted between about 60 inches  
5 and 100 inches above the moving fabric web.

6. The system of Claim 1 wherein, the controller determines the amount of light reflected from the moving fabric web using the received, captured image of the preselected portion of the moving fabric web.

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7. The system of Claim 6 further including a platen mounted proximate to the downstream end of the fabric conveyor, the platen having a color that contrasts with the color of the moving fabric web.

15 8. The system of Claim 7, wherein the controller locates left and right edges of the moving fabric web using the captured, received image of the preselected portion of the moving fabric web based upon light contrast between the platen and the moving fabric web.

9. The system of Claim 1 wherein the controller is a PID closed loop controller.

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10. The system of Claim 9 wherein the controller causes the width setting of the mechanical spreader to change from the first width set point to the second width set point based upon proportional, integral, and derivative relationships between the first width set point and the second width set point.

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11. The system of Claim 10 wherein the controller converts the sum of the proportional, integral, and derivative relationships into a pulse of power to the mechanical spreader.

12. A system for controlling the stitch count of a moving fabric web compacted by a fabric compactor system, the fabric compactor system having a compaction chamber, wherein the compaction chamber has an intake roller and a retard roller, a fabric conveyor, and a folder, wherein the fabric conveyor is downstream of the compaction chamber, the fabric conveyor has a downstream end that delivers a compacted fabric web to a folder, comprising:

(a) a camera that captures an image of a preselected portion of the moving fabric web;

(b) a controller, wherein the controller receives from the camera the captured image of the preselected portion of the moving fabric web;

calculates the stitch count of the preselected portion of the moving fabric web using the received, captured image;

compares the calculated stitch count to a first stitch count set point; and

causes a compaction setting of the compaction chamber to change from the first stitch density set point to a second stitch density set point if the calculated stitch density of the preselected portion of the moving fabric web varies from the first stitch density set point; and

wherein, the image of the preselected portion of the moving fabric web is captured proximate to the downstream end of a fabric conveyor.

13. The system of Claim 12 wherein the camera is a CCD camera, the CCD camera being positioned to capture an image of a preselected portion of a first side of the moving fabric web.
- 5 14. The system of Claim 13 further including:
- (a) a light source positioned so that it illuminates the second side of the moving fabric web; and
  - (b) a light controller for automatically adjusting the intensity of the light source based on a backlit image of the fabric web.
- 10 15. The system of Claim 14 wherein the light controller:
- receives backlit images of the fabric, calculates the light level;
  - compares the light level of the images to an established setpoint; and
  - automatically adjusts the intensity of the light.
- 15 16. The system of Claim 13 wherein the CCD camera is mounted between about 1 inch and 2 inches from the moving fabric web.
17. The system of Claim 14 wherein the light source is a strobe light.
- 20 18. The system of Claim 17 further including a tube connected to the strobe for focusing the light on the preselected portion of the moving fabric web.
19. The system of Claim 18 wherein the tube is a fiber optic tube or a liquid light tube.
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20. The system of Claim 14 wherein the light controller comprises:
- (a) a vision processor that measures the light intensity, and adjusts the light intensity in response to measured light intensity; and
  - (b) a movable holder having a plurality of light filters mounted therein.

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21. The system of Claim 20 wherein the vision processor adjusts the light intensity by varying the light output of the light source.

22. The system of Claim 20 wherein the vision processor adjusts the light intensity by  
10 moving a selected one of the plurality of light filters to a position between the light source and the preselected portion of the moving fabric web.

23. The system of Claim 20 wherein the vision processor adjusts the light intensity by  
varying the light output of the light source and by moving a selected one of the plurality of  
15 light filters to a position between the light source and the preselected portion of the moving fabric web.

24. The system of Claim 12 wherein the controller is a PID closed loop controller.

20 25. The system of Claim 12 wherein the controller changes the rotational speed of the retard roller based on the difference between the calculated stitch count of the preselected portion of the moving fabric web and the first stitch density set point.

26. The system of Claim 25 wherein the controller causes the rotational speed of the  
25 retard roller to change upon proportional, integral, and derivative relationships calculated

stitch count of the preselected portion of the moving fabric web and the first stitch density set point.

27. The system of Claim 26 wherein the controller converts the sum of the proportional,  
5 integral, and derivative relationships into an adjusted speed ratio for the retard roller.

28. An system for controlling the width and stitch density of a moving fabric web  
compacted by a fabric compactor system, the fabric compactor system having a mechanical  
spreader, a compaction chamber downstream from the mechanical spreader, wherein the  
10 compaction chamber has an intake roller and a retard roller, a fabric conveyor downstream of  
the compaction chamber, wherein the fabric conveyor has a downstream end that delivers a  
compacted fabric web to a folder, wherein the folder is downstream of the fabric conveyor,  
comprising:

- (a) a width control subsystem comprising:
  - 15 (i) a first camera, wherein the first camera captures an image of a  
preselected portion of a moving fabric web;
  - (ii) a first controller, wherein the first controller receives from the first  
camera the captured image of the preselected portion of the moving fabric web;  
calculates the width of the preselected portion of the moving fabric web using  
20 the received, captured image;  
compares the calculated width of the moving fabric web to a first width set  
point; and  
causes a width setting of the mechanical spreader to change from the first  
width set point to a second width set point if the calculated width of the preselected  
25 portion of the moving fabric web varies from the first width set point;

wherein, the image of the preselected portion of the moving fabric web is captured proximate to the downstream end of a fabric conveyor.

(b) a stitch count control subsystem comprising:

(i) a second camera that captures an image of a preselected portion of the moving fabric web;

(ii) a second controller, wherein the second controller receives from the second camera the captured image of the preselected portion of the moving fabric web;

calculates the stitch count of the preselected portion of the moving fabric web using the received, captured image;

compares the calculated stitch count to a first stitch count set point; and

causes a compaction setting of the compaction chamber to change from the first stitch density set point to a second stitch density set point if the calculated stitch density of the preselected portion of the moving fabric web varies from the first stitch density set point; and

wherein, the image of the preselected portion of the moving fabric web is captured proximate to the downstream end of a fabric conveyor.

29. The system of Claim 28, wherein the first and second cameras are CCD cameras.

30. The system of Claim 28 wherein the first camera captures an image of the entire width of the moving fabric web.

31. The system of Claim 30 wherein the first CCD camera is mounted between about 60 inches and 100 inches above the moving fabric web.

32. The system of Claim 28 wherein, the first controller determines the amount of light reflected from the moving fabric web using the received, captured image of the preselected portion of the moving fabric web.

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33. The system of Claim 32 further including a platen mounted proximate to the downstream end of the fabric conveyor, the platen having a color that contrasts with the color of the moving fabric web.

10 34. The system of Claim 33, wherein the first controller locates left and right edges of the moving fabric web using the captured, received image of the preselected portion of the moving fabric web based upon light contrast between the platen and the moving fabric web.

35. The system of Claim 28 wherein the first controller is a PID closed loop controller.

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36. The system of Claim 35 wherein the first controller causes the width setting of the mechanical spreader to change from the first width set point to the second width set point based upon proportional, integral, and derivative relationships between the first width set point and the second width set point.

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37. The system of Claim 36 wherein the first controller converts the sum of the proportional, integral, and derivative relationships into a pulse of power to the mechanical spreader.



38. The system of Claim 29 wherein the second CCD camera is positioned to capture an image of a preselected portion of a first side of the moving fabric web.
39. The system of Claim 37 further including:
- 5 (a) a light source positioned so that it illuminates the second side of the moving fabric web; and
- (c) a light controller for automatically adjusting the light intensity of the light source based on a backlit image of the fabric web.
- 10 40. The system of Claim 39 wherein the light controller:
- receives backlit images of the fabric, calculates the light level;
- compares the light level of the images to an established setpoint; and
- automatically adjusts the intensity of the light.
- 15 41. The system of Claim 29 wherein the second CCD camera is mounted between about 1 inch and 2 inches from the moving fabric web.
42. The system of Claim 39 wherein the light source is a strobe light.
- 20 43. The system of Claim 42 further including a tube connected to the strobe for focusing the light on the preselected portion of the moving fabric web.
44. The system of Claim 43 wherein the tube is a fiber optic tube or a liquid light tube.
- 25 45. The system of Claim 39 wherein the light controller comprises:

- (a) a vision processor that measures the light intensity, and adjusts the light intensity in response to; and
- (b) a movable holder having a plurality of light filters mounted therein.

5 46. The system of Claim 45 wherein the vision processor adjusts the light intensity by varying the light output of the light source.

47. The system of Claim 45 wherein the vision processor adjusts the light intensity by moving a selected one of the plurality of light filters to a position between the light source  
10 and the preselected portion of the moving fabric web.

48. The system of Claim 45 wherein the vision processor adjusts the light intensity by varying the light output of the light source and by moving a selected one of the plurality of light filters to a position between the light source and the preselected portion of the moving  
15 fabric web.

49. The system of Claim 28 wherein the second controller is a PID closed loop controller.

50. The system of Claim 28 wherein the second controller changes the rotational speed of  
20 the retard roller based on the difference between the calculated stitch count of the preselected portion of the moving fabric web and the first stitch density set point.

51. The system of Claim 50 wherein the controller causes the rotational speed of the retard roller to change upon proportional, integral, and derivative relationships calculated

stitch count of the preselected portion of the moving fabric web and the first stitch density set point.

52. The system of Claim 51 wherein the controller converts the sum of the proportional,  
5 integral, and derivative relationships into an adjusted speed ratio for the retard roller.

53. A method for controlling the width of a moving fabric web that is moving through a fabric compactor system, the fabric compactor system having a mechanical spreader, a fabric conveyor and a folder, wherein the mechanical spreader is located upstream of the fabric  
10 conveyor, and the fabric conveyor has a downstream end that delivers a moving fabric web to a folder, comprising:

(a) with a camera, capturing an image of a preselected portion of a moving fabric web;

(b) sending to a controller the captured image of the preselected portion of the  
15 moving fabric web, wherein the controller;

calculates the width of the preselected portion of the moving fabric web using the received, captured image;

compares the calculated width of the moving fabric web to a first width set point; and

20 causes a width setting of the mechanical spreader to change from the first width set point to a second width set point if the calculated width of the preselected portion of the moving fabric web varies from the first width set point;

wherein, the image of the preselected portion of the moving fabric web is captured proximate to the downstream end of a fabric conveyor.

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54. The method of Claim 53, wherein the camera is a CCD camera.

55. The method of Claim 53 wherein the camera is mounted to capture a series of digital of the fabric web.

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56. The method of Claim 53 wherein the camera captures an image of the entire width of the moving fabric web.

57. The method of Claim 54 wherein the CCD camera is mounted between about 60  
10 inches and 100 inches above the moving fabric web.

58. The method of Claim 51 wherein, the controller:  
determines the amount of light reflected from the moving fabric web using the  
received, captured image of the preselected portion of the moving fabric web; and  
15 creates a contrast sufficient to analyze the image based on the amount of reflected  
light.

59. The method of Claim 58 further including a platen mounted proximate to the  
downstream end of the fabric conveyor, the platen having a color that contrasts with the color  
20 of the moving fabric web.

60. The method of Claim 59, wherein the controller locates left and right edges of the  
moving fabric web using the captured, received image of the preselected portion of the  
moving fabric web based upon light contrast between the platen and the moving fabric web.

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61. The method of Claim 53 wherein the controller is a PID closed loop controller.

62. The method of Claim 61 wherein the controller causes the width setting of the mechanical spreader to change from the first width set point to the second width set point  
5 based upon proportional, integral, and derivative relationships between the first width set point and the second width set point.

63. The system of Claim 62 wherein the controller converts the sum of the proportional, integral, and derivative relationships into a pulse of power to the mechanical spreader.

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64. A method for controlling the stitch count of a moving fabric web compacted by a fabric compactor system, the fabric compactor system having a compaction chamber, wherein the compaction chamber has an intake roller and a retard roller, a fabric conveyor, and a folder, wherein the fabric conveyor is downstream of the compaction chamber, the  
15 fabric conveyor has a downstream end that delivers a compacted fabric web to a folder, comprising:

- (a) with a camera, capturing an image of a preselected portion of the moving fabric web;
- (b) sending to a controller the captured image, wherein the controller;  
20 receives from the camera the captured image of the preselected portion of the moving fabric web;  
calculates the stitch count of the preselected portion of the moving fabric web using the received, captured image;  
compares the calculated stitch count to a first stitch count set point; and

causes a compaction setting of the compaction chamber to change from the first stitch density set point to a second stitch density set point if the calculated stitch density of the preselected portion of the moving fabric web varies from the first stitch density set point; and

5                    wherein, the image of the preselected portion of the moving fabric web is captured proximate to the downstream end of a fabric conveyor.

65.     The method of Claim 64 wherein the camera is a CCD camera, the CCD camera being positioned to capture an image of a preselected portion of a first side of the moving fabric  
10   web.

66.     The method of Claim 65 further including:

(a)     a light source positioned so that it illuminates the second side of the moving fabric web; and

15        (c)     a light controller for automatically adjusting the light intensity of the light source based on a backlit image of the fabric web.

67.     The system of Claim 66 wherein the light controller:

receives backlit images of the fabric, calculates the light level;

20        compares the light level of the images to an established setpoint; and

automatically adjusts the intensity of the light.

68.     The method of Claim 65 wherein the CCD camera is mounted between about 1 inch and 2 inches from the moving fabric web.

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69. The method of Claim 66 wherein the light source is a strobe light.
70. The method of Claim 69 further including a tube connected to the strobe for focusing the light on the preselected portion of the moving fabric web.
- 5 71. The method of Claim 70 wherein the tube is a fiber optic tube or a liquid light tube.
72. The method of Claim 66 wherein the light controller comprises:
- 10 (a) a vision processor that measures the light intensity, and adjusts the light intensity in response to changes in color, weight, or thickness of the fabric web; and
- (b) a movable holder having a plurality of light filters mounted therein.
73. The method of Claim 72 wherein the vision processor adjusts the light intensity by varying the light output of the light source.
- 15 74. The method of Claim 72 wherein the vision processor adjusts the light intensity by moving a selected one of the plurality of light filters to a position between the light source and the preselected portion of the moving fabric web.
- 20 75. The method of Claim 72 wherein the vision processor adjusts the light intensity by varying the light output of the light source and by moving a selected one of the plurality of light filters to a position between the light source and the preselected portion of the moving fabric web.
- 25 76. The method of Claim 64 wherein the controller is a PID closed loop controller.

77. The method of Claim 64 wherein the controller changes the rotational speed of the retard roller based on the difference between the calculated stitch count of the preselected portion of the moving fabric web and the first stitch density set point.

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78. The method of Claim 64 wherein the controller causes the rotational speed of the retard roller to change upon proportional, integral, and derivative relationships of the calculated stitch count of the preselected portion of the moving fabric web and the first stitch density set point.

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79. The method of Claim 78 wherein the controller converts the sum of the proportional, integral, and derivative relationships into an adjusted speed ratio for the retard roller.